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(54) **POWER ADAPTING DEVICE**

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USPC 439/171–173
See application file for complete search history.

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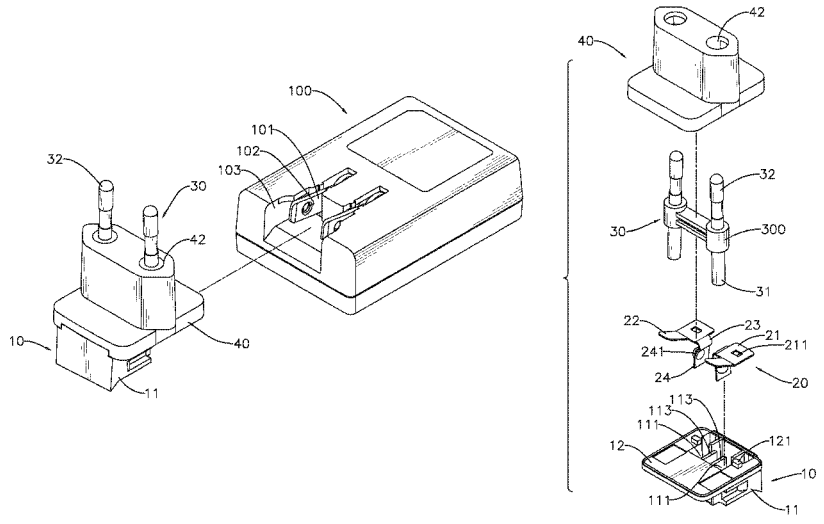
Primary Examiner — Ross Gushi

(57) **ABSTRACT**

A power adapting device has a connecting seat, at least two conductive strips, and an adapter. The connecting seat has a mounting portion with two slots. The at least two conductive strips are mounted in the connecting seat. Each of the at least two conductive strips has a positioning sheet, a conductive sheet obliquely protruding upward from the positioning sheet, an arced sheet protruding down from the positioning sheet, and an engaging sheet protruding down from the arced sheet. The engaging sheet has a semispherical contact. The adapter is electrically connected to the conductive sheets of the at least two conductive strips. With different power adapting devices of different standards using in cooperation with a charger, the charger can comply with different electrical socket standards via the power adapting devices.

5 Claims, 6 Drawing Sheets



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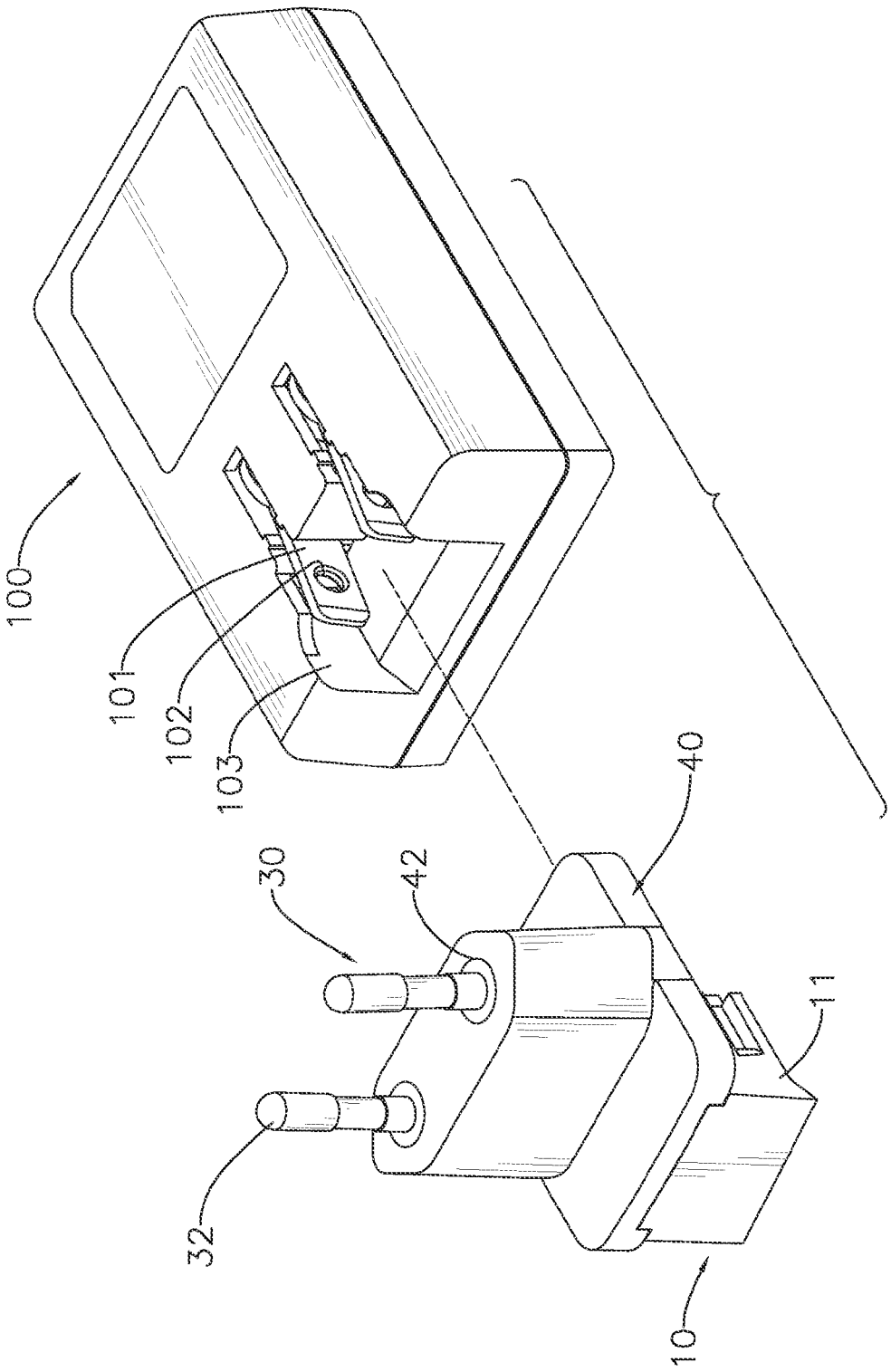

FIG. 1

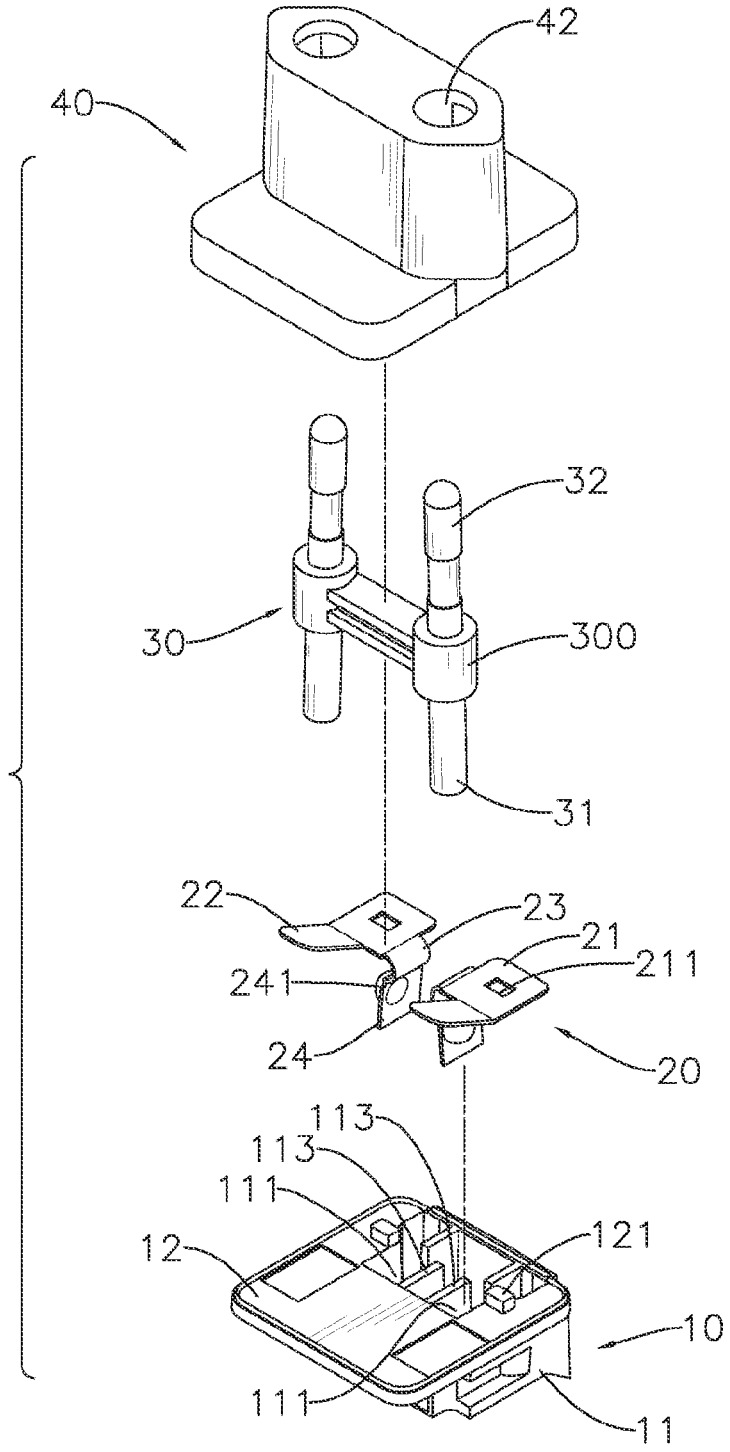
42
40
32
30
300
31
22
23
21
211
241
24
20
113
113
111
12
121
10
111
11

FIG. 2

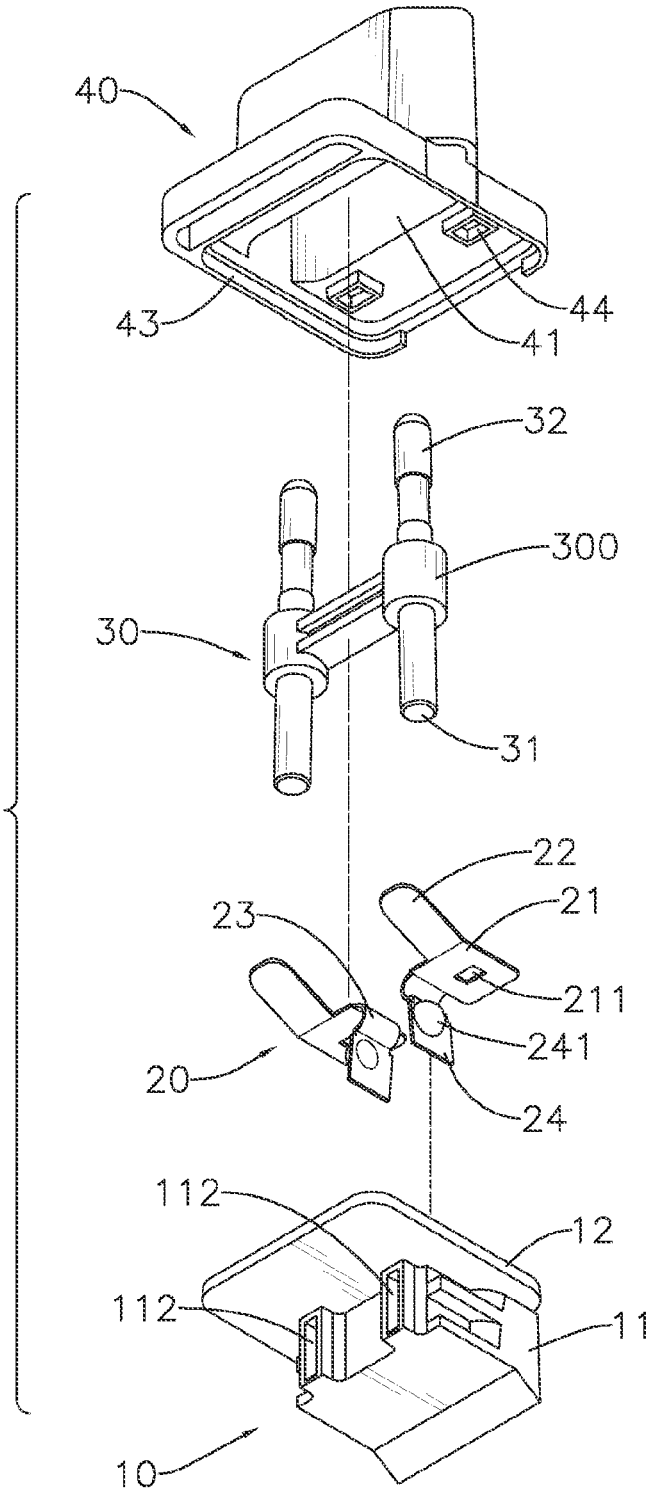

FIG. 3

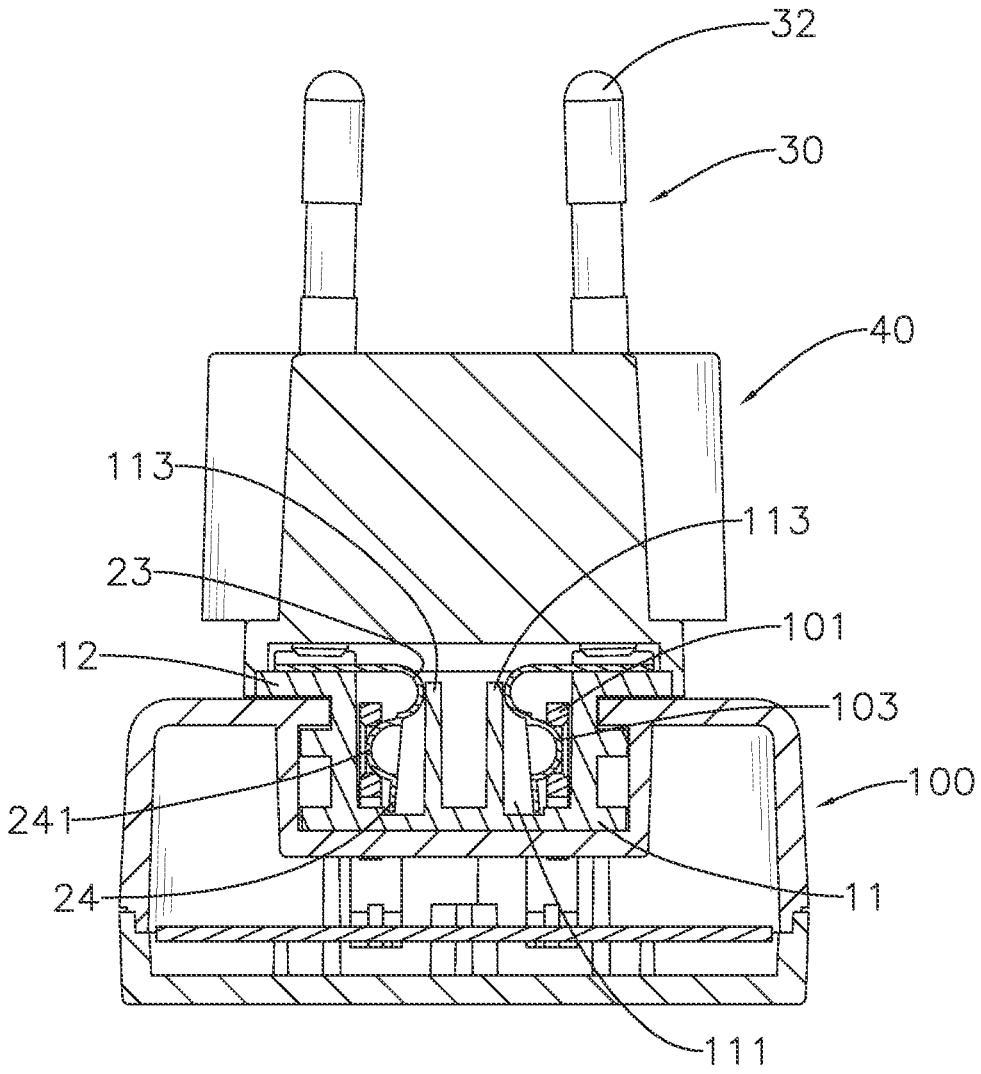

FIG. 4

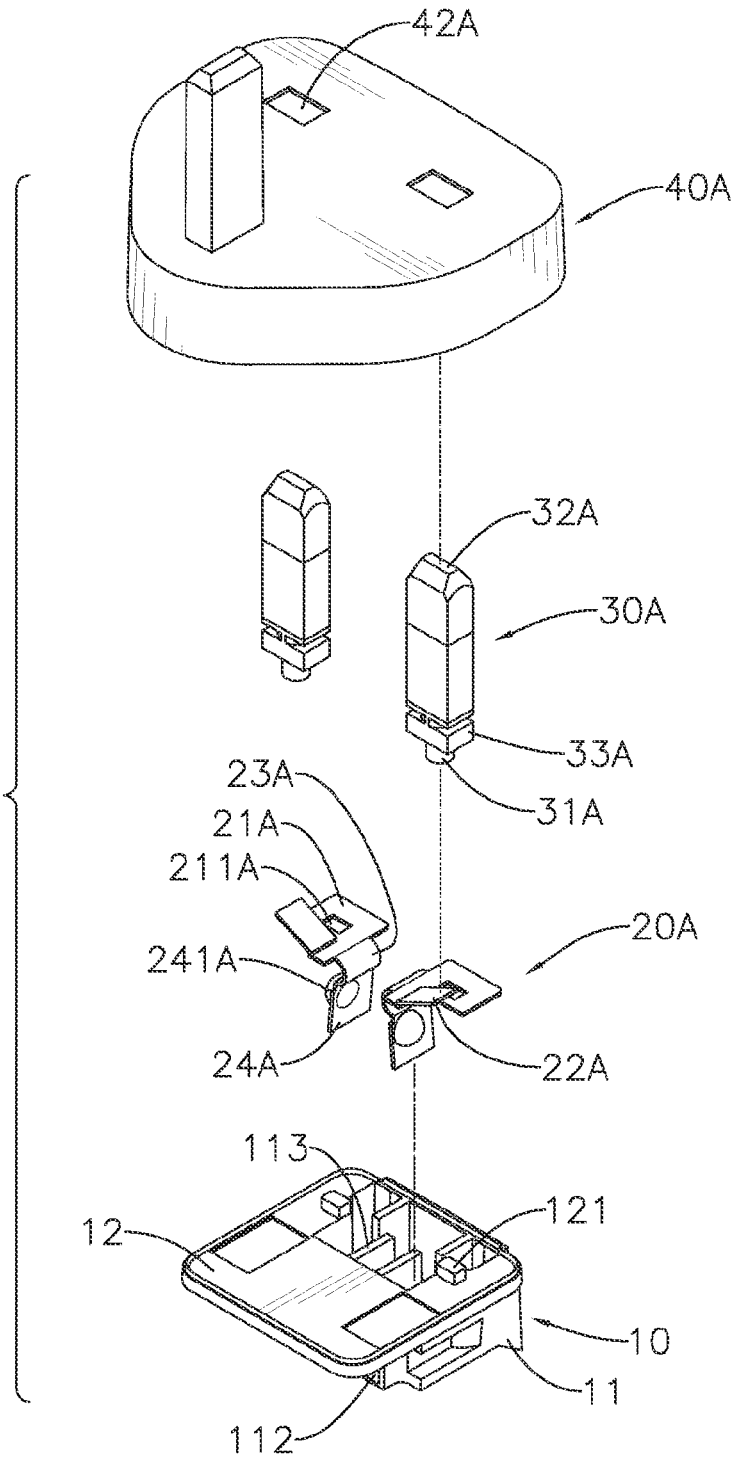
42A
40A
32A
30A
33A
31A
23A
21A
211A
241A
20A
24A
22A
113
121
12
10
11
112

FIG. 5

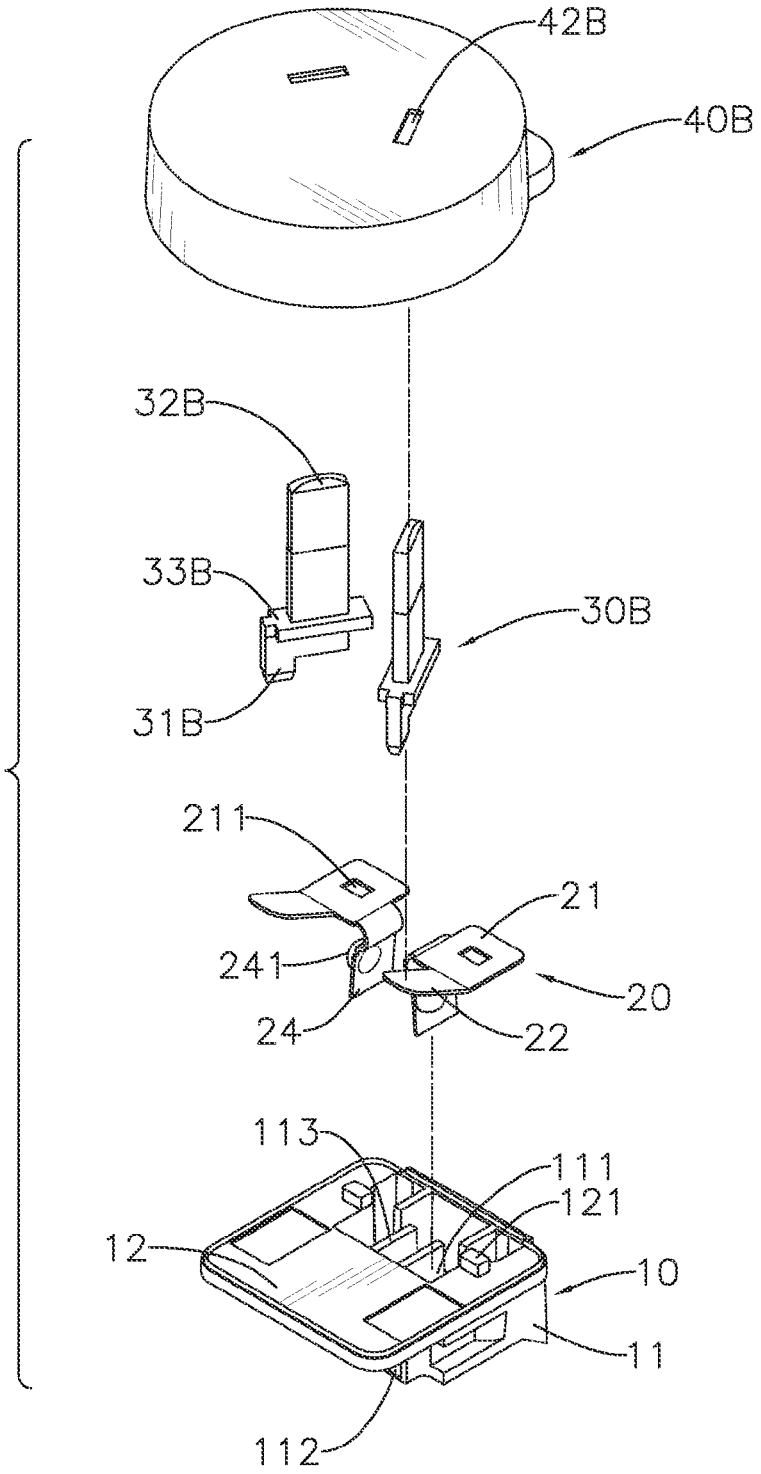
42B
40B
32B
33B
30B
31B
211
21
241
20
24
22
113
111
121
12
10
11
112

FIG. 6

POWER ADAPTING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a power adapting device, especially to a power adapting device for a charger, such that the charger can comply with different electrical socket standards.

2. Description of the Prior Art(s)

In recent years, usage of consumer electronic products, such as smart phones, tablet computers, portable listening devices, and the like, has been greatly increased. Since the electronic product is continuously used for a long time in everyday life and consumes much electric power, a user of the electronic product would carry a charger along with him so as to recharge the electronic product whenever needed. The charger has multiple power input pins and multiple power output pins. The power input pins are inserted in an electrical socket. The power output pins are electrically connected to the electronic product. Thus, the electronic product is charged through the charger. However, the electrical sockets differ by countries, and so do the power input pins of the charger. For example, a charger with American standard power input pins is unable to be fitted in a European standard socket or a United Kingdom (UK) standard socket. Therefore, whenever a business traveler goes on the trip abroad and wants to charge the electronic products carried with him, the business traveler has to prepare a charger that has power input pins fitting in the specific socket of the country, and preparing different chargers for different country is troublesome.

To overcome the shortcomings, the present invention provides a power adapter to mitigate or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

The main objective of the present invention is to provide a power adapting device. The power adapting device has a connecting seat, at least two conductive strips, and an adapter. The connecting seat has a mounting portion with two slots. The at least two conductive strips are mounted in the connecting seat. Each of the at least two conductive strips has a positioning sheet, a conductive sheet obliquely protruding upward from the positioning sheet, an arced sheet protruding down from the positioning sheet, and an engaging sheet protruding down from the arced sheet. The engaging sheet has a semispherical contact. The adapter is electrically connected to the conductive sheets of the at least two conductive strips.

With different power adapting devices of different standards used in cooperation with a charger, the charger can comply with different electrical socket standards via the power adapting devices.

Other objectives, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an operational exploded perspective view of a first embodiment of a power adapting device in accordance with the present invention;

FIG. **2** is an exploded perspective view of the power adapting device in FIG. **1**;

FIG. **3** is another exploded perspective view of the power adapting device in FIG. **1**;

FIG. **4** is a cross-sectional rear view of the power adapting device in FIG. **1**;

FIG. **5** is an exploded perspective view of a second embodiment of a power adapting device in accordance with the present invention; and

FIG. **6** is an exploded perspective view of a third embodiment of a power adapting device in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to FIGS. **1**, **2**, and **5**, a power adapting device in accordance with the present invention comprises a connecting seat **10**, at least two conductive strips **20**, **20**A, and an adapter.

With further reference to FIG. **3**, the connecting seat **10** has a mounting portion **11** and a connecting portion **12**. The mounting portion **11** has a top, a sidewall, a mounting recess **111**, and two slots **112**. The mounting recess **111** is formed in the top of the mounting portion **11**. The slots **112** are separately formed through the sidewall of the mounting portion **11** and communicate with the mounting recess **111**. The connecting portion **12** is formed on the top of the mounting portion **11**, is formed as a panel, and extends beyond the sidewall of the mounting portion **11**. The connecting portion **12** has an upper surface and two protrusions **121**. The protrusions **121** are separately formed on the upper surface of the connecting portion **12** and are oppositely disposed by the mounting recess **111** of the mounting portion **11**.

With further reference to FIG. **4**, the at least two conductive strips **20**, **20**A are mounted in the connecting seat **10**. Each of the at least two conductive strips **20**, **20**A is integrally formed as a single part and has a positioning sheet **21**, **21**A, a conductive sheet **22**, **22**A, an arced sheet **23**, **23**A, and an engaging sheet **24**, **24**A.

The positioning sheet **21**, **21**A is mounted on the upper surface of the connecting portion **12** and has a peripheral edge and a positioning hole **211**, **211**A. The positioning hole **211**, **211**A is formed through the positioning sheet **21**, **21**A and engages with a corresponding one of the protrusions **121** of the connecting portion **12** of the connecting seat **10**.

The conductive sheet **22**, **22**A is formed on and protrudes from the peripheral edge of the positioning sheet **21**, **21**A, and obliquely extends upward relative to the upper surface of the connecting portion **12**.

The arced sheet **23**, **23**A is formed on and protrudes down from the peripheral edge of the positioning sheet **21**, **21**A, is disposed next to the conductive sheet **22**, **22**A, and protrudes in the mounting recess **111** of the mounting portion **11**. The arced sheet **23**, **23**A has a lower edge. Preferably, a curvature of the arced sheet **23**, **23**A can be adjusted, such that a resilience of the arced sheet **23**, **23**A is adjusted accordingly.

The engaging sheet **24**, **24**A is formed on and protrudes down from the lower edge of the arced sheet **23**, **23**A and has a side surface and a semispherical contact **241**, **241**A. The semispherical contact **241**, **241**A is formed on the side surface of the engaging sheet **24**, **24**A. Specifically, the engaging sheet **24**, **24**A is stamped to form the semispherical contact **241**, **241**A.

As shown in FIGS. **2** to **4**, in a first preferred embodiment of the power adapting device, the mounting portion **11** of the connecting seat **10** further has an inner bottom and two dividing panels **113**. The inner bottom of the mounting portion **11** is defined in the mounting recess **111** of the mounting portion **11**. The dividing panels **113** are separately formed in the mounting recess **111** and protrude up from the inner bottom of

the mounting portion **11**. The dividing panels **113** divide the mounting recess **111** into an intermediate space and two side spaces. The side spaces are oppositely disposed by the intermediate space and respectively align with the slots **112**. The protrusions **121** of the connecting portion **12** are respectively disposed by the side spaces of the mounting recess **111** of the mounting portion **11**. The power adapting device has two conductive strips **20**. The conductive strips **20** respectively protrude in the side spaces of the mounting recess **111** of the mounting portion **11** of the connecting seat **10**. The conductive sheet **22** of each conductive strip **20** has a proximal edge. The arced sheet **23** and the engaging sheet **24** of each conductive strip **20** are mounted in a corresponding one of the side spaces of the mounting recess **111** of the mounting portion **11**. The arced sheet **23** further has an upper edge and a convex surface. The upper edge of the arced sheet **23** is perpendicular to the proximal edge of the conductive sheet **22**. The convex surface of the arced sheet **23** faces and abuts a corresponding one of the dividing panels **113** of the mounting portion **11**.

As shown in FIG. **5**, in a second preferred embodiment of the power adapting device, the upper edge of the arced sheet **23**A of each conductive strip **20**A is parallel to the proximal edge of the conductive sheet **22**A of the conductive strip **20**A.

With reference to FIGS. **2**, **3**, **5**, and **6**, the adapter is mounted on the connecting seat **10** and has a cap **40**, **40**A, **40**B and two conductive prongs **30**, **30**A, **30**B.

The cap **40**, **40**A, **40**B is securely mounted on the connecting seat **10** and has a top portion, a bottom, a close fit recess **43**, an inner top, a mounting chamber **41**, two prong holes **42**, **42**A, **42**B, and two pressing frames **44**. The close fit recess **43** is formed in the bottom of the cap **40**, **40**A, **40**B for the connecting portion **12** of the connecting seat **10** to be tightly fitted in the close fit recess **43** of the cap **40**, **40**A, **40**B. The inner top of the cap **40**, **40**A, **40**B is defined in the close fit recess **43**. The mounting chamber **41** is formed in the bottom of the cap **40**, **40**A, **40**B, and is formed in the inner top of the cap **40**, **40**A, **40**B. The prong holes **42**, **42**A, **42**B are separately formed through the top portion of the cap **40**, **40**A, **40**B and communicate with the mounting chamber **41**. The pressing frames **44** are separately formed on the inner top of the cap **40**, **40**A, **40**B, are respectively mounted around the protrusions **121** of the connecting portion **12** of the connecting seat **10**, and respectively press against the positioning sheets **21**, **21**A of the conductive strips **20**, **20**A.

With further reference to FIG. **4**, the conductive prongs **30**, **30**A, **30**B are respectively mounted through the prong holes **42**, **42**A, **42**B of the cap **40**, **40**A, **40**B and respectively contact the conductive sheets **22**, **22**A of the conductive strips **20**, **20**A. Each conductive prong **30**, **30**A, **30**B has an abutting end portion **31**, **31**A, **31**B and a protruding end portion **32**, **32**A, **32**B. The abutting end portion **31**, **31**A, **31**B contacts the conductive sheet **22**, **22**A of a corresponding one of the conductive strips **20**, **20**A. The protruding end portion **32**, **32**A, **32**B is mounted through a corresponding one of the prong holes **42**, **42**A, **42**B of the cap **40**, **40**A, **40**B and protrudes up from the top portion of the cap **40**, **40**A, **40**B.

As shown in FIG. **2**, in the first preferred embodiment, each prong hole **42** of the cap **40** is circular. The adapter further has a connecting member **300**. The connecting member **300** has two ends respectively attached securely to the conductive prongs **30**.

As shown in FIG. **5**, in the second preferred embodiment, each prong hole **42**A of the cap **40**A is triangular. Each conductive prong **30**A is triangular in cross-section and further has a limit panel **33**A. The limit panel **33**A is formed between the abutting end portion **31**A and the protruding end portion **32**A of the conductive prong **30**A and is mounted in the mounting chamber **41**. A size of the limit panel **33**A is larger than a size of the corresponding prong hole **42**A of the cap **40**A, such that the limit panel **33**A abuts the top portion of the cap **40**A and the conductive prong **30**A does not drop out from the cap **40**A.

As shown in FIG. **6**, in a third preferred embodiment, each prong hole **42**B of the cap **40**B is elongated. Each conductive prong **30**A is formed as a blade and further has a limit panel **33**B. The limit panel **33**B is formed between the abutting end portion **31**B and the protruding end portion **32**B of the conductive prong **30**B and has an end edge. The end edge of the limit panel **33**B is flush with a side edge of the abutting end portion **31**B. A size of the limit panel **33**B is larger than a size of the corresponding prong hole **42**B of the cap **40**B, such that the limit panel **33**B abuts the top portion of the cap **40**B and the conductive prong **30**B does not drop out from the cap **40**B.

With reference to FIGS. **1** and **4**, an American standard charger **100** has an adapting recess **103** and two pins **101**. The pins **101** are of American standard and are pivotally mounted in the adapting recess **103**. Each pin **101** is formed as a blade, is disposed parallel to the other pin **101**, and has a conducting hole **102**. The pins **101** are used for being fitted in an electrical socket.

When the charger **100** is used in cooperation with the power adapting device of the present invention, the mounting portion **11** of the connecting seat **10** is mounted in the adapting recess **103** of the charger **100**. The pins **101** of the charger **100** are respectively inserted into the slots **112** of the connecting seat **10** and respectively press against the engaging sheets **24**, **24**A of the conductive strips **20**, **20**A. Then, the arced sheets **23**, **23**A of the conductive strips **20**, **20**A are further arced and the semispherical contact **241**, **241**A of the engaging sheet **24**, **24**A respectively engage in the contacting holes **102** of the pins **101**. Thus, the conductive strips **20**, **20**A of the power adapting device are electrically connected to the pins **101** of the charger **100**.

Preferably, when the conducting hole on each pin is omitted, the pin becomes a Chinese standard pin and the charger becomes a Chinese standard charger. When the pins are respectively inserted into the slots **112** of the connecting seat **10** and respectively press against the engaging sheets **24**, **24**A of the conductive strips **20**, **20**A, the semispherical contact **241**, **241**A of the engaging sheet **24**, **24**A respectively abut the Chinese standard pins.

The power adapting device as described has the following advantages. The connecting seat **10** of the power adapting device is formed with modular design for mounting the conductive prongs **30**, **30**A, **30**B of different standards. Since the power adapting device is detachable from the charger **100**, when a user goes on a trip abroad, the user can replace the power adapting device on the charger **100** so as to fit sockets of a specific country and to supply electrical power to electronic products that the user carries along. Furthermore, with the arced sheet **23**, **23**A formed on the conductive strips **20**, **20**A, a clamping strength of the engaging sheet **24**, **24**A can be enhanced. Accordingly, elastic fatigue of the engaging sheet **24**, **24**A does not occur easily.

Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and features of the invention, the disclosure is illustrative only. Changes may be made in the details, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A power adapting device comprising:

a connecting seat having

a mounting portion having

a top;

a sidewall;

a mounting recess formed in the top of the mounting portion; and

two slots separately formed through the sidewall of the mounting portion and communicating with the mounting recess; and

a connecting portion formed on the top of the mounting portion, the connecting portion formed as a panel and having an upper surface;

at least two conductive strips mounted in the connecting seat, and each of the at least two conductive strips integrally formed as a single part and having

a positioning sheet mounted on the upper surface of the connecting portion and having a peripheral edge;

a conductive sheet formed on and protruding from the peripheral edge of the positioning sheet;

an arced sheet formed on and protruding down from the peripheral edge of the positioning sheet, disposed next to the conductive sheet, and protruding in the mounting recess of the mounting portion, and the arced sheet having a lower edge; and

an engaging sheet formed on and protruding down from the lower edge of the arced sheet and having

a side surface; and

a semispherical contact formed on the side surface of the engaging sheet; and

an adapter mounted on the connecting seat and having

a cap securely mounted on the connecting seat and having

a top portion;

a bottom;

a mounting chamber formed in the bottom of the cap; and

two prong holes separately formed through the top portion of the cap and communicating with the mounting chamber; and

two conductive prongs respectively mounted through the prong holes of the cap and respectively contacting the conductive sheets of the conductive strips.

2. The power adapting device as claimed in claim 1, wherein the mounting portion of the connecting seat further has

an inner bottom defined in the mounting recess of the mounting portion; and

two dividing panels separately formed in the mounting recess and protruding up from the inner bottom of the mounting portion, the dividing panels dividing the mounting recess into an intermediate space and two side spaces, and the side spaces oppositely disposed by the intermediate space and respectively aligning with the slots.

3. The power adapting device as claimed in claim 2, wherein

the connecting portion of the connecting seat further has two protrusions separately formed on the upper surface of the connecting portion and respectively disposed by the side spaces of the mounting recess of the mounting portion;

the positioning sheet of each of the at least two conductive strips further has a positioning hole formed through the positioning sheet and engaging with a corresponding one of the protrusions of the connecting portion of the connecting seat; and

the arced sheet and the engaging sheet of each of the at least two conductive strips are mounted in a corresponding one of the side spaces of the mounting recess of the mounting portion, and the arced sheet further has a convex surface facing and abutting a corresponding one of the dividing panels of the mounting portion.

4. The power adapting device as claimed in claim 3, wherein

the cap further has

a close fit recess formed in the bottom of the cap for the connecting portion of the connecting seat to be tightly fitted in the close fit recess of the cap;

an inner top defined in the close fit recess; and

two pressing frames separately formed on the inner top of the cap, respectively mounted around the protrusions of the connecting portion of the connecting seat, and respectively pressing against the positioning sheets of the conductive strips;

the mounting chamber of the cap is formed in the inner top of the cap; and

each conductive prong has

an abutting end portion contacting the conductive sheet of a corresponding one of the conductive strips; and

a protruding end portion mounted through a corresponding one of the prong holes of the cap and protruding up from the top portion of the cap.

5. The power adapting device as claimed in claim 4, wherein the adapter further has a connecting member, and the connecting member has two ends respectively attached securely to the conductive prongs.

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